AMENDMENTS TO THE CLAIMS

Applicants respectfully request that all previous versions of the claims be replaced with the following listing:

1. (Previously presented) A method for detecting flash gas in a vapour-compression refrigeration or heat pump system comprising a compressor, a condenser, an expansion device, and an evaporator interconnected by conduits providing a flow path for a refrigerant, the method comprising the steps of:

determining a first rate of heat flow of a heat exchange fluid flow across a heat exchanger of the system and a second rate of heat flow of the refrigerant across the heat exchanger; and

using the rates of heat flow for establishing an energy balance from which a parameter for monitoring the refrigerant flow is derived.

2. (Previously presented) The method according to claim 1, wherein the heat exchanger is the evaporator.

3. (Previously presented) The method according to claim 1, wherein the heat exchanger is the condenser.

4. (Previously presented) The method according to claim 1, wherein establishing the first rate of heat flow is determined by establishing a heat exchange fluid mass flow and a specific enthalpy change of the heat exchange fluid across the heat exchanger.

5. (Previously presented) The method according to claim 4, wherein establishing the heat exchange fluid mass flow as a constant based on empirical data or on data obtained under faultless operation of the system.

6. (Previously presented) The method according to claim 4, wherein establishing the specific enthalpy change of the heat exchange fluid across the heat exchanger based on measurements of the heat exchange fluid temperature before and after the heat exchanger.

7. (Previously presented) The method according to claim 1, wherein establishing the second rate of heat flow of the refrigerant by establishing a refrigerant mass flow and a specific enthalpy change of the refrigerant across the heat exchanger.

8. (Previously presented) The method according to claim 7, wherein establishing the refrigerant mass flow based on a flow characteristic of the expansion device, and the expansion device opening passage and/or opening period, and an absolute pressure before and after the expansion device, and if necessary any subcooling of the refrigerant at the expansion device entry.

9. (Previously presented) The method according to claim 7, wherein establishing the specific enthalpy difference of the refrigerant flow based on registering the temperature and pressure of the refrigerant at expansion device entry and registering the refrigerant evaporator exit temperature and the refrigerant evaporator exit pressure or the saturation temperature of the refrigerant at the evaporator inlet.

10. (Previously presented) The method according to claim 1, wherein establishing a residual as difference between the first rate of heat flow and the second rate of heat flow.

11. (Previously presented) The method according to claim 10, wherein providing a fault indicator by means of the residual, the fault indicator being provided according to the formula:

$$S_{\mu_1,i} = \begin{cases} S_{\mu_1,i-1} + s_i, \ when \ S_{\mu_1,i-1} + s_{\mu_1,i} > 0 \\ 0, \ when \ S_{\mu_1,i-1} + s_{\mu_1,i} \le 0 \end{cases}$$

where $s_{\mu_1,i}$ is calculated according to the following equation:

$$s_{\mu_1,i} = -k_1\left(r_i - \frac{\mu_0 + \mu_1}{2}\right)$$

where

ri: residual

k1: proportionality constant

μ0: first sensibility value

μ1: second sensibility value.

12. (Previously presented) A flash gas detection device for a vapour-compression refrigeration or heat pump system comprising a compressor, a condenser, an expansion device, and an evaporator interconnected by conduits providing a flow path for a refrigerant, wherein the device comprises:

means for determining a first rate of heat flow of a heat exchange fluid flow across a heat exchanger of the system and a second rate of heat flow of the refrigerant across the heat exchanger, and using the rates of heat flow for establishing an energy balance from which a parameter for monitoring the refrigerant flow is derived; and

evaluation means for evaluating the refrigerant mass flow, and generate an output signal.

13. (Previously presented) The device according to claim 12, wherein the means for determining the first rate of heat flow comprises means for sensing heat exchange fluid temperature before and after a heat exchanger.

14. (Previously presented) The device according to claim 12, wherein the means for determining the second rate of heat flow comprises means for sensing the refrigerant temperature and pressure at expansion device entry, and means for establishing the pressure at the expansion device exit or the saturation temperature.

15. (Previously presented) The device according to claim 12, wherein the means for establishing the second rate of heat flow comprises means for sensing absolute refrigerant pressure before and after the expansion device and means for establishing an opening passage or opening period of the expansion device.

16. (Previously presented) The device according to claim 12, wherein the evaluation means comprises means for establishing a residual as difference between a first value, which is made up of the mass flow of the heat exchange fluid flow and the specific enthalpy change across a heat exchanger of the system, and a second value, which is made up of the refrigerant mass flow and the specific refrigerant enthalpy change across a heat exchanger of the system.

17. (Previously presented) The device according to claim 12, wherein the device further comprises memory means for storing the output signal and means for comparing said output signal with a previously stored output signal.

18. (New) A computer-implemented method for detecting flash gas in a vapour-compression refrigeration or heat pump system comprising a compressor, a condenser, an expansion device, and an evaporator interconnected by conduits providing a flow path for a refrigerant, the method comprising the steps of:

determining a first rate of heat flow of a heat exchange fluid flow across a heat exchanger of the system and a second rate of heat flow of the refrigerant across the heat exchanger;

using the rates of heat flow for establishing an energy balance from which a parameter for monitoring the refrigerant flow is derived; and

activating an alarm based on the parameter exceeding a pre-determined threshold value.